REMARKS

The present amendment is in response to the Office Action dated July 9, 2009. No claims are amended in this response. However, all claims are shown herein for the Examiner's convenience.

Claims 1-3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Jang et al. (US Patent No. 6,229,121). The applicants respectfully traverse this rejection and request reconsideration. The Office Action incorrectly states that Jang "discloses a thermal switch ***(Fig. 1&2: Col 2: lines 19-21)*** for controlling the flow of heat between a heat source ***(22, Col 2: lines 34-35)*** and a heat sink ***(3, Col 2, lines 54-57, wherein a base is a heat sink).***" (Office Action, page 2). This statement mischaracterizes the entire nature of Jang and the operation described therein. At the outset, it should be noted that Jang is directed to a thermally-activated electrical switch. As illustrated in Fig. 2-3 of Jang, a metallic layer 111 is formed on a mesa structure 11 to provide electrical contact between two contact points 31 formed on the baseboard 3 of the device. In Fig. 2, the metallic layer 111 is in full contact with both contact points 31 to form a closed circuit between the contact points. In Fig. 3, a heating element 22 on the epitaxial layer 2 has been heated to produce a buckling effect "to detach the metallic layer 111 of the mesa structure from the contact points 31 on the baseboard 3 to cut off the circuit." *(Col 2, lines 59-62).* Jang further states, "when the heating element 22 is uneffectuated, the metallic layer 111 of the mesa structure 11 returns back to the normal state, and by the above, an external load is controlled." *(Col. 2, lines 62-65).* Thus, Jang discloses a thermally-activated electrical switch.

The Office Action asserts that there is heat flow between the heat 22 and the baseboard 3. Jang provides no such teaching. While the heating element 22 can be characterized as a heat source, nothing in Jang teaches a structure to switch from a state of high thermal conductance between the heating element 22 and the baseboard 3 to a state of low thermal conductance.

Furthermore, Jang discloses that the baseboard 3 may be made in ceramic or materials used for printed circuit board (PCB). Neither of these materials is known for its thermal conductivity characteristics. Thus, the baseboard 3 does not serve well as a thermal sink. In addition, Jang discloses no such function for the baseboard 3. Thus, nothing in Jang discloses a mechanism to form a path of high thermal conductance between the heat element 22 and the baseboard 3. Jang discloses an electrical switch, and nothing more.

In contrast, claim 1 is directed to "a thermal switch for controlling the flow of heat between a heat source and a heat sink." Jang discloses no such properties. Furthermore, there is nothing inherent in Jang that provides such thermal conductivity. The electrical connection between the contact points 31 provided by the metallic layer 111 provides no inherent path of high thermal conductance between the heat element 22 and the baseboard 3.

In addition, Jang does not teach at least one nanostructure, "configured to alternately form a path of high thermal conductance between the heat source and the heat sink via the at least one nanostructure, and a path of low thermal conductance between the heat source and the heat sink," as recited in claim 1. Accordingly, Claim 1 is clearly allowable over Jang. Claims 2-3 are also allowable in view of the fact that they depend from Claim 1, and further in view of the recitation in each of those claims.

Claim 4 stands rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Jang and U.S. Patent No. 5,682,075 to Bolleman et al. The applicant respectfully traverses this rejection and requests reconsideration. The inapplicability of Jang has already been discussed in detail above. Specifically, Jang teaches a thermally-activated electrical switch , but is unrelated to a thermal switch. Jang discloses no thermal conductivity characteristics of any of the structures disclosed therein.

The addition of Bolleman does not overcome the serious deficiencies of Jang. Bolleman is cited for the disclosure of an electrostatic transducer. However, the electrostatic transducer in Bolleman is used to control gas flow. Bolleman does not disclose any applications to control thermal conductivity. Thus, the combination of Jang

and Bolleman are not related to any thermal switch and do not disclose an electrostatic transducer to deflect to the first position upon application of a voltage to the transducer to thereby form a path of high-thermal conductance, as recited in Claim 4. In addition, the combination of Jang and Bolleman suggested by the Office Action provide a non-functional circuit. In Jang, the heating element 22 causes the buckling of the mesa 11 to activate the electrical switch. The Office Action suggests replacing the thermal activation mechanism of Jang with the electrostatic activation mechanism of Bolleman. However, the replacement of the heating element 22 in Jang with the electrostatic element from Bolleman eliminates the very component that the Office Action cites as the heat source in so-called thermal switch. Thus, Jang and Bolleman cannot be combined in the manner suggested in the Office Action. Accordingly, Claim 4 is clearly allowable over the combination of Jang and Bolleman.

Claims 5 and 8-9 stand rejected under 35 U.S.C. § 103(a) as unpatentable by U.S. Patent No. 6,229,121 to Jang at el. combined with U.S. Patent Publication No. 2002/0043895 to Richards. The applicants respectfully traverse this rejection and request reconsideration. The inapplicability of Jang has already been discussed in detail above. The combination of Richards and Jang does not overcome the serious deficiencies of Jang. The Office Action cites Richards as disclosing a piezoelectric transducer that deflects to the first position upon application of a voltage to the transducer. The Office Action asserts that it would have been obvious "to one having ordinary skill in the art at the time the invention was made to modify the Jang et al. '121 actuator to include the use of the piezoelectric transducer as taught by Richards et al. '895." (See Office Action, page 5). The replacement of the Jang actuator (i.e., the heating element 22) with a piezoelectric transducer of Richards results in a non-functional circuit. The Office Action suggests replacing the thermally-buckling mesa material in Jang with the piezoelectric transducer thus eliminating the need for the heating element 22 in Jang. However, the combination suggested in the Office Action effectively eliminates what the Office Action has identified as the heat source in the so-called thermal switch. Thus, the combination of references suggested in the Office Action results in a non-functional circuit.

With respect to Claim 8, the Office Action asserts that Richards discloses the use of a fluid-tight cavity containing an insulating gas. However, the section of Richards cited in the Office Action contains no such disclosure. The fluid disclosed in Richards may be a refrigerant, such as R11. A characteristic of such a fluid is that it heats upon compression and cools upon expansion. There is nothing that refers to the liquid in the cavity of Richards as an insulating gas, as asserted by the Office Action. Thus, Claim 8 is allowable over the combination of Jang and Richards.

Claims 6 and 7 stand rejected under 35 U.S.C. § 103(a) as unpatentable by U.S. Patent No. 6,229,121 to Jang et al. combined with U.S. Patent Publication No. 2003/0117770 to Montgomery. The applicants respectfully traverse this rejection and request reconsideration. The inapplicability of Jang has already been discussed in detail above. The addition of Montgomery to Jang does not overcome the serious deficiencies of Jang. The Office Action recognizes that Jang does not disclose nanostructures as part of a thermal switch, or a nanostructure comprising a bundle of carbon nanotubes. The Office Action cites Montgomery as disclosing carbon nanotubes "to improve thermal performance of the thermal switch." (Office Action, page 6). However, as noted above with respect to claim 1, Jang does not a thermal switch, but a thermally-activated electrical switch. Furthermore, Montgomery does not disclose a thermal switch.

It is unclear from the Office Action what structure in Jang would be replaced by the carbon nanotubes disclosed in Montgomery. However, if the mesa in Jang were replaced by carbon nanotubes, the functionality of Jang as an electrical switch would be destroyed. Thus, the combination of references suggested in the Office Action destroys the functionality of the components in Jang. It is further noted that the carbon nanotubes in Montgomery are fixed in nature and provide no thermal switching characteristics as recited in Claim 1, and in dependent Claims 6-7. For at least these reasons, Claims 6 and 7 are allowable over the combination of Jang and Montgomery.

In view of the above amendments and remarks, reconsideration of the subject application and its allowance are kindly requested. The applicant has made a good faith effort to place all claims in condition for allowance. If questions remain

regarding the present application, the Examiner is invited to contact the undersigned at (206) 757-8029.

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